OHIO ROAD COMMISSION
REPORT, 1893

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OHIO STATE UNIVERSITY.

PRESENTED BY L. M. Bloomfield.

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L. M. Bloomfield

Compliments of Martin Dodge.

OHIO STATE UNIVERSITY

REPORT

OF THE

Ohio Road Commission

TO

Hon. WILLIAM McKINLEY

GOVERNOR OF OHIO

MADE BY

MARTIN DODGE, PRES'T,
DAVID S. OLIVER, SEC'Y,
J. R. DUNLAP,
D. W. SPRAGUE,
} *Commissioners*

UNDER AUTHORITY OF HOUSE JOINT RESOLUTION NO. 59,
SEVENTIETH GENERAL ASSEMBLY, AND
FILED DEC. 21, 1893.

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HOUSE JOINT RESOLUTION NO. 59.—MR. DODGE.

Authorizing the Governor to appoint a Commission for the purposes therein named.

Whereas, *The Governor of Ohio, in his last annual message, most earnestly asked the consideration of the General Assembly to the subject of good roads; and suggested the appointment of a Commission to investigate and carefully consider all plans proposed and experiments being made, and to submit a report with recommendations in time for the meeting of the first session of the next General Assembly; and*

Whereas, *It is the opinion of many engineers and inventors that electric and other artificial powers may be successfully applied to the country roads, when properly prepared, so as to reduce the cost and time of transportation, both on freight and passengers, far below that which can ever be attained by the continued use of horses and other animals; therefore,*

Be it Resolved, *By the General Assembly of the State of Ohio, That the Governor be and he is hereby authorized to appoint a Commission, composed of four suitable citizens of the State, two of whom shall be chosen from each of the two political parties which received the largest number of votes in this State at the last general election, whose duty it shall be to thoroughly investigate the whole subject of road construction and the cost of transportation over the various kinds of roads, including those operated by steam power and electric power as well as those operated by horse power. Said Commission shall make report to the Governor what the average cost per ton per mile now is by horse power, and what the approximate cost would be if artificial power should be substituted for horse power; and especially whether it is possible and advisable to construct country roads so that both cars and wagons can pass over the same road, propelled by either horse power or artificial power; also the estimated cost of such combination roads as compared with the cost of roads established for horse power only, together with whatever recommendation they have to make as to the road laws of Ohio, or as to the enactment of any new laws by the Legislature of the State. The report containing the findings, conclusions and recommendations of such commission shall be transmitted by the Governor to the General Assembly, together with such comments as he may by message see fit to make thereon, and such additional recommendations as he may desire to make. Said Commission shall conclude its investigation and file its report with the Governor, as aforesaid, on or before the 21st day of December, 1893.*

LEWIS C. LAYLIN,
Speaker of the House of Representatives.
ANDREW L. HARRIS,
President of the Senate.

Adopted February 28, 1893.

HON. WILLIAM McKINLEY,
GOVERNOR OF OHIO:

The Road Commission, appointed by Your Excellency under authority of H. J. R. No. 59, passed February 28th, 1893, was directed "to thoroughly investigate the whole subject of road construction and the cost of transportation over the various kinds of roads, including those operated by steam power and electric power as well as those operated by horse power. Said Commission shall make report to the Governor what the average cost per ton per mile now is by horse power and what the approximate cost would be if artificial power should be substituted for horse power; and especially whether it is possible and advisable to construct country roads so that both cars and wagons can pass over the same road, propelled by either horse power or artificial power, also the estimated cost of such combination roads as compared with the cost of roads established for horse power only, together with whatever recommendation they have to make as to the road laws of Ohio, or as to the enactment of any new laws by the legislature of the State."

The Commission has held several meetings and has entered into correspondence with parties all over the State and has gathered such facts and figures as were obtainable in the limited time allotted it for its labors. As a matter of history and for reference for future laborers in the cause of road improvement, it may be here noted that the agitation for good roads is not confined to Ohio alone but in a greater or less degree prevails all over the United States. Starting in a small way it has almost assumed a National character. Foremost among the agencies that have been active in promoting this agitation is the National League for Good Roads, whose constitution and list of officers are appended to our report. This League held a convention at Chicago, Illinois, October 20-21, 1892, and another convention at Washington, D. C., January 17-18, 1893. The proceedings of both Conventions have been published in pamphlet form and we file copies of the same for reference with our report.

Another means for promoting knowledge on the subject of good roads was found in the organization known as the League of American Wheelmen. This is an Association composed of bicycle riders and others interested in bicycling and has branches in every State of the Union and numbers its members by the thousands. Under its auspices the publication of a monthly periodical was undertaken, entitled "Good Roads." A special number devoted to the State of Ohio, was recently issued, and we file a copy of the same with our report. Articles have appeared in various periodicals on the subject of good roads, too numerous to mention.

One of the labors of the Commission has been an investigation into the

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laws enacted in other states relating to road construction. Among recent enactments on the subject we note the following:—

A law was enacted in New Jersey in 1891, the distinctively new feature of which is that one-third of the cost of making the roads provided for in the law should be paid out of the State treasury. The amount that can be withdrawn from the State treasury under this law is limited. A previous law provided that one-third of the cost of building County roads should be paid by the cities, towns, townships or boroughs in and through which said road passed, and two-thirds of the cost should be paid by the county at large. Under this law great improvements were made in the roads of Union County, New Jersey.

The State of Massachusetts on June 10th, 1893, passed a law providing for the appointment of a permanent Highway Commission consisting of three members whose term of office shall be three years. The Commissioners are paid a salary of two thousand dollars each annually and are allowed their travelling expenses in addition. The Commission is to compile statistics relating to the public roads, may be consulted without charge relative to road construction, shall make maps showing public roads and location of material suitable for road building, and shall hold one public meeting each year in each County of the State. Upon petition as prescribed by law, the Commission may build new roads or convert existing roads into State highways. In all cases the roads shall be graded at the expense of the County or Counties through which they run. It is evident that this law practically puts the entire cost of constructing and maintaining the public roads on the state at large.

We have also made an inquiry into the present condition of the roads in each County of the State of Ohio and the results are tabulated in *Appendix A* attached to our report. From this table we learn that about two-thirds of the Counties in Ohio have nothing better than common dirt roads, over which to transport goods and merchandise.

The two largest factors in the problem of improving our common roads are, first, the enormous cost of such improvements in the aggregate, if the system is co-extensive with our territory, and, second, the excessive cost of transportation over such roads, if animal power is to be applied. The mileage of common roads in the State of Ohio may be approximated at 80,000 miles. The cost of suitable improvement would be, in some sections $9,000 per mile; in others it may cost as little as $3,000 per mile. If we have an equal amount of each kind, that would make an average cost of $6,000 per mile. Supposing this could be reduced to $5,000 per mile on the average it would still cost the enormous sum of $400,000,000 to improve all the roads in the State. The Governor of New York, in the North American Review for November, 1893, in speaking of a national system (which he condemns on account of its excessive burdens), says: "The cost would be inconceivable.

The task of constructing them would overwhelm the Government. It would necessitate the employment of a larger army of men than was engaged in the War of the Rebellion."

Such a burden should not be undertaken by the State, in aid of transportation, unless it is reasonably certain that the benefits to be derived from it are greater than the burden to be assumed. It is not so easy to estimate the benefit of road improvement as it is to estimate the cost, for these benefits are mostly indirect, appearing in the increased value of land and the increased comforts of life. They add greatly to the social and moral influences which make for higher civilization.

But the comparative benefits of these road improvements may be had by reference to the cost of transportation over steam railroads and electric street railways—the one adapted for the long haul, the other for the short haul. It will appear that the steam cars and the electric cars have already contributed more to cheapen transportation *without the aid of public money* than the wagon road improvement has done *with the aid of public money*. It has always been the policy of our people to contribute freely of the public money in aid of transportation. The rivers and harbors have been deepened by appropriations made by the General Government; and the waterways, connecting the Great Lakes, have been deepened by the same means, while the State and Counties have constructed and maintained at public expense the canals and the public roads. The idea of improving the "National Road" by the General Government was not abandoned until it appeared that no amount of public money expended for such a purpose and in such a manner, could contribute so much to cheapen transportation as the steam railroad could do without the aid of public money.

But, when it was discovered that the cost of transportation over a free wagon road built and maintained at the public expense was more than ten times as much, both in time and money, as the cost of the same transportation over a railroad receiving no public aid, the "National Road" soon became a thing of the past. The fate of the "National" Road will be the fate of the State Roads. It would be a mistaken policy for the State to improve wagon roads between distant places with a view of cheapening transportation when the steam roads have already cheapened transportation between these places more than can be done by wagon roads with any amount of public money.

Another important and unforeseen change has taken place since the wagon road system was laid out. They not only provided for State Roads and National Roads but they provided roads for a people uniformly distributed over the surface of the country. It now appears that about one-half of our people live in cities and that the other half desire the most direct means of communication with them. The following extract is submitted from the United States Census Report of 1890:

Census Years.	Population of the United States.	Population of cities.	Inhabitants of cities in each 100 of the total population.
1790	3,929,214	131,472	3.35
1800	5,308,483	210,873	3.97
1810	7,239,881	356,920	4.93
1820	9,633,822	475,135	4.93
1830	12,866,020	864,509	6.72
1840	17,069,453	1,453,994	8.52
1850	23,191,876	2,897,586	12.49
1860	31,443,321	5,072,256	16.13
1870	38,558,371	8,071,875	20.93
1880	50,155,783	11,318,547	22.57
1890	62,622,250	18,235,670	29.12

"It will be seen that the proportion of urban population has increased gradually during the past century from 3.35 up to 29.12 per cent., or from one-thirtieth to nearly one-third of the total population. The increase has been quite regular from the beginning up to 1880, while from 1880 up to 1890 it has made a leap from 22.57 up to 29.12 per cent., thus illustrating in a forcible manner the accelerated tendency of our population toward urban life. The number of cities having a population of more than 8,000 increased from 6 in 1790 to 286 in 1880, whence it has leaped to 443 in 1890.

"This urban element is distributed very unequally over the country, as is shown below by geographical divisions:

Geographical Divisions.	Urban Population.	Per cent. of entire Urban Population.
Total	18,235,670	100.00
North Atlantic division	8,976,426	49.22
South Atlantic division	1,420,455	7.79
North Central division	5,791,272	31.76
South Central division	1,147,147	6.29
Western division	900,370	4.94

"The North Atlantic division contains nearly one-half the urban population of the country, while the North Atlantic and North Central divisions together contain nearly five-sixths of it.

"In the North Atlantic division 51.58 per cent., or more than one-half the entire population, is contained in cities of 8,000 or more inhabitants. During the past ten years the urban element in this division has increased 43.53 per cent., while the total population has increased but 19.95 per cent. This relative increase is well distributed among the several states of this division with the single exception of Vermont, whose urban element has increased but little. In Maine, Vermont, Massachusetts and New York the numerical increase in the urban element is greater than the increase of the total population, so that in these states the rural population has actually diminished in number. This rapid increase in the urban element of the North Atlantic division is due to the equally rapid extension of the manufactures and commerce, requiring the aggregation of the inhabitants into compact bodies.

"In the North Central division 25.90 per cent., or a trifle more than one-fourth of the inhabitants, are classed as urban. In the past ten years the number of the urban element has nearly doubled, while the total population has increased but 28.78 per cent. The number of cities has increased from 95 in 1880 to 152 in 1890. The increase in number of urban population, viz., 2,766,593, is comprised mainly in a few large cities; thus the total increase in the eleven largest cities, comprising a trifle more than one-half of the urban population of this section, is 1,446,089, or more than one-half, the entire gain in urban population in this division."

It also appears that there are 70 cities in Ohio, each having a population of over 4,000, and all containing about one-half of the people of the State. These centers of population are the natural centers of the road system of the future.

The demand for additional legislation is one that the Commission does not favor. Among a certain class of reformers, it is the custom to invoke the law-making power upon every possible occasion. They start by proposing some end desirable itself and then commit the mistake of supposing that because the object to be accomplished is good, the means proposed must necessarily be laudable. In our judgment, the case of good roads affords a notable object lesson in this respect. To improve our country roads and bring them to a more perfect condition than those in some foreign countries is certainly a "consummation devoutly to be wished,"—that the way to accomplish this result is by placing new laws on the statute books does not necessarily follow. The history of road-making in Ohio will bear us out in this assertion. We have in Ohio to-day in some localities miles upon miles of excellent pike roads built under existing laws. What has been done in one locality can be done in another under the same circumstances. Why, then, are not good roads built everywhere in the State? The reasons are two-fold. First, because the inhabitants do not sufficiently appreciate and desire good roads, and, secondly, because good roads are too expensive. There are, undoubtedly, some places in the State where material for road-making is sufficiently abundant and cheap, but where the character of the population is such that they prefer the discomforts and loss occasioned by defective highways to the trouble and expense required to improve the roads. It is manifest that no legislation can or should alter such a state of affairs. It is not the province of legislation to change human nature, and where a community deliberately prefers to adopt a course of action that is opposed to its best interests, it should be left to its own devices. On the other hand, there are localites in Ohio where the materials for road construction are almost, if not entirely lacking and the cost makes it practically impossible to transport them. No legislation, short of making other parts of the State pay for building roads in these localities, would be effective in such cases. This proposition has, indeed, been advocated by some and has been adopted in New Jersey, where in certain cases, the State pays one-third of the cost of constructing a road. In the opinion of the Commission, however, this plan is not advisable. This question naturally leads to a discussion regarding the proper unit of territory to which should be committed the task of road improvement. There are those who advocate National, State, County and Township control, and also various combinations of these, such as National or State financial aid under local supervision and actual construction. Without going into an exhaustive discussion of the subject, we are convinced that National or State aid is unwise and that with the govermental machinery existing in Ohio, the County authorities are the proper ones to manage road construction, and that the necessary funds should be raised within the limits of the County where the roads are built. The community of interest in a County is such that it may properly be considered a unit in the matter of road building, and the fairest plan for all concerned is, perhaps, to assess a portion of the cost upon the abutting land and place the balance upon the general tax duplicate.

The tendency of legislation in Ohio of late has been to pass special laws authorizing townships and counties to construct roads, and placing the greater part of the cost upon the general tax duplicate.

There seems to be a general dissatisfaction with the law by which road taxes are worked out by the citizens living along the roads. This is a custom surviving from early days and yet we are unaware of any plan that could be substituted and meet with approval from those directly interested. The trouble here, perhaps, is not so much with the law itself as with the manner in which it is executed. With efficient officers, better results could, no doubt, be obtained. It is undeniable that the time, labor and money expended in "working" the roads, if properly used, would put our roads in far better condition than they are. It might naturally be supposed that men repairing the roads in front of their own farms, would be stimulated to obtain the best results from their labor. This reasonable anticipation, however, in a majority of cases is disappointed. Upon inquiry, we have learned that paying the taxes entirely in money to be expended under the supervision of some public officer has not worked well in practice. Such officers have been accused of favoritism and corruption, and a return to the old system has followed. It is difficult to see what legislation can be devised to remedy such a state of affairs.

In all movements of this kind there is a great deal of uncertainty in the proposals made. Legislation to be effective must not be too radical a departure from what has preceeded. Custom is more powerful than law. Hence a study of European laws is not of any great utility except as they are grafted by degrees upon our customs and laws. The conclusion to which the Commission has come, is to recommend no legislation. We do this for several reasons. The time at our disposal has not been sufficient to properly prepare and digest a law in the manner that we consider to be necessary.

The proposed laws submitted by others to the members of the Commission have all been opened to objections that are considered by us to be fatal. In addition, there did not seem to be any wide-spread demand for new laws in reply to the inquiries we sent out upon this subject.

The most essential thing at this time is an intelligent agitation of the question of improving highways. If those, most directly interested, can be persuaded that good roads pay and they are willing to bear the cost, any necessary laws can be obtained with little difficulty. Laws enacted in advance of public sentiment on the subject will be ineffective.

The unexampled development of railroad facilities has made the problem of highways entirely different from what it was before the advent of the locomotive. The dream of our earlier statesmen of uniting this country by means of National Roads traversing it from East to West and from North to South, has been realized, but in a manner different from what they imagined. Railroads have been found cheaper and more effective than pikes. The cost of transportation on steam cars has been greatly reduced within the past few years, so much so that the average rate is but little more than one-half cent per ton per mile, while the maximum rate in this State for the short haul is but five cents per ton per mile in car load lots. On the contrary, there has been but little reduction in the cost of transportation with horses and wagons over common roads, either paved or unpaved, for, while there has been some improvement in vehicles and in horses, there has been an increased cost in the labor required for such purposes, also an increase in the expense of feeding and maintaining animals; so that what is gained in one way is lost in another, and the average rate of transportation with horses and wagons still remains exceedingly high, being probably twenty-five cents per ton per mile on the average. This great disparity between the cost of transportation upon steam cars and with horses anp wagons makes it forever impossible that the latter could be a successful competitor with the former, except for very short distances, so that the question of the long haul is already settled and the horse and wagon is not a factor in the problem.

The changed condition of the population by which one-half is concentrated in certain centers of population makes it undesirable, if it were still possible, to compete with the steam cars, for the universal tendency of the people outside of the centers of population is to communicate directly with these centers of population which are not far removed.

The Census Report of 1890 shows that twenty-eight Counties in the

State have a smaller population than they had by the Census of 1880, and that seven hundred and sixty Townships and innumerable villages, have shared the same fate. It is also true that there no longer remains a single village in all the State, of any considerable size, that is not located at a railway station. Much the larger part of the one-half of our population which live in cities, live in a few large cities, and the desire of those using horses and wagons for transportation is either to go to the smaller villages situated at the railway stations and then use the steam cars to transport themselves or their products to the main centers of population, or, in case they live sufficiently near the main centers, to transport immediately with horses and wagons; so that any system of roads to be built in this State, so as to best serve the wants of the people, must radiate either from the great centers of population to the circumjacent territory, or else from the railway stations of roads leading to these centers of population. These facts would indicate that the wagon roads are and must continue to be more a matter of local interest and local benefit than of State interest and general benefit. Rightly considered, the question is a local one, pure and simple. The people who use a road are those living in the immediate neighborhood. Statistics are not at hand and, perhaps, could not be gathered, but it is safe to say that the average haul on our roads is not over five or ten miles at the outside. No one would pretend for a moment that a pike between Cincinnati and Cleveland was necessary or desirable on account of the through traffic between those cities. Further, it is largely a matter of indifference to the citizens of Cincinnati whether there are good roads leading into Cleveland or not. They are only concerned with the condition of the roads about their own city. Therefore, it cannot be asserted with any degree of truth that the building of roads is a concern of the State at large and that the State as such should raise money by taxation to be expended by her in improving the roads where good roads are lacking. There are two valid objections to this: In the first place, there are Counties in Ohio that have improved their roads at their own expense in the past; they have borne the burden willingly and are now enjoying the benefits. To tax these Counties again for the purpose of building roads in localities where the people, through lack of enterprise or inability, have failed to secure good highways, is unjust and is discouraging to enterprise. Why should Logan County or Hardin County or Union County in which turnpikes have been built by local assessment, be required to contribute money for the purpose of building roads in Geauga County where there is not a single mile of turnpike. It is sometimes urged, in answer to this question, that backward or poor communities should be put on an equality in this respect with their richer and more fortunate neighbors. This argument appears to us utterly fallacious. Charity is an excellent thing and its exercise should not be discouraged, and whenever the farmers living in a region already piked, desire, through love of their less fortunate brethren, to donate money for the purpose of improving their means of transit, no one can object to their doing so. This, however, is an entirely different thing from the power of the State being used through taxation in forcing the former to build roads for the latter. Stripped of its disguises, it amounts to levying a forced loan to be spent away from home.

There is a second objection to building roads by the State. Every law enacted on this subject will of necessity be permissive and not mandatory. If a community shall express a desire to improve its roads, the law will be so framed as to secure State aid in doing so. The most enthusiastic advocate of road improvement will hardly contend that a community should be forced to build good roads. What will be the practical effect of such a law? Evidently not that the poorest sections of the State will enter upon an era of road building because the same reasons that keep them from paying the entire cost will hinder them from assuming part of the cost. In all probability the same communities that now build roads and pay the entire cost themselves, will avail themselves of the opportunity to put part of the burden upon others; and thus we shall have the strange spectacle of the poorer sections of the State being taxed to aid those parts of the State that need no aid. The advocates of State aid in building roads are, therefore, in a dilemma. Either they compel progressive communities to aid backward communities (which is manifestly unjust), or they force the latter to aid the former, which is even a still more glaring injustice. Such persons are, therefore, forced to maintain that the whole State is vitally interested in the improvement of highways in any part of the State—a position we have heretofore shown to be untenable.

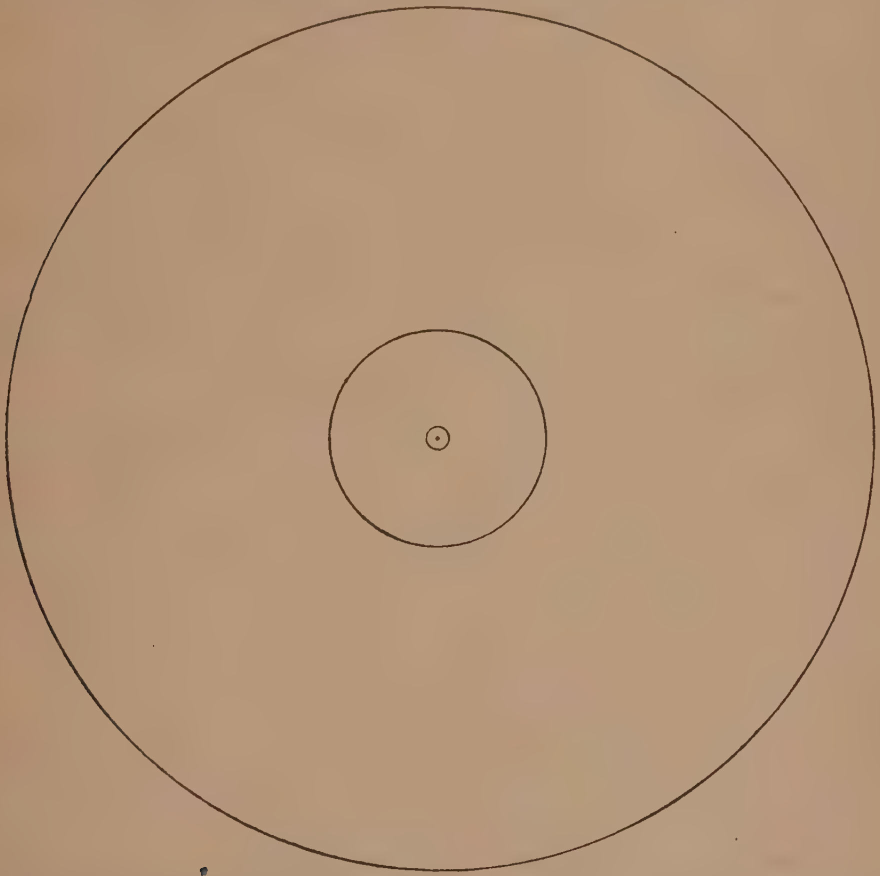
Another objection to State control and construction of highways lies in the creation of additional offices. This tendency is one to be discouraged. There are enough offices in existence now. It is practically and physically impossible for any man or any commission to superintend and oversee the thousands upon thousands of miles of highways in Ohio. Either their duties would be nominal, in which case they are useless, or if their duties were real, they would be too numerous and too burdensome to be borne. No central office can be aware of the needs of a community to the same extent as those living in the community, nor could such an office or bureau look after the expenditure of money so minutely as persons directly interested can. Besides, with every new office created, there must be a system of checks and balances devised, and the "red tape" thus necessitated, goes far to counterbalance any good effects to be expected.

We do not consider that a State officer or commission would be of any great utility as a means of diffusing information relative to road building. The inhabitants of Hamilton County do not need to be told by an officer stationed at the State Capital, that her hills are full of an excellent quality of limestone that can be advantageously used as a macadam in building turnpikes. Hardin County would not, for the first time, become aware of her gravel banks by seeing them located upon a State Geological map; and our unfortunate brethren, living in Counties where the mud is axle deep in Spring, could derive but a melancholy satisfaction in having their lack of road material officially announced from the State House. Books, pamphlets, and numberless newspapers and magazine articles have discussed the theory and practice of road building, and it would serve no useful purpose to have this information again collected and published. Competent engineers already know how to build good highways, and a State Commission could not add to their knowledge on this subject.

There is another consideration that should deter us from entering upon any extensive scheme for improving our roads, requiring the expenditure of vast sums of money. It is a significant fact, to which attention has been frequently called, that the history of the developement of the means of transportation shows no instance in which, after a better means has been devised, mankind has gone back to a former method. Every improvement in the means of transportation reduces the comparative value of the former means of transportation and frequently destroys it altogether. The bridle path and the pack animal disappear as soon as wheeled vehicles are placed upon the common roads in competition. The oxteam is abandoned for horses, and the post-rider for the stage-coach. These, in turn, all give way and disappear wherever it is possible to introduce a steam car or an electric car. It is undeniable that the developement of the railway arrested the building of wagon roads on a large scale such as the "National Road" running through Ohio. The horse-car in cities superceded other methods for carrying passengers, and the electric and cable cars have about rendered the horse-car obsolete. With the advent of the electric car has come a developement along a line totally unexpected, and that is its extension into the suburban and rural districts. It is too early to predict the extent to which the building of electric railways in the country districts will be carried. The franchises that are being granted for the construction of electric lines connecting different towns would seem to indicate a possible expansion in this direction hitherto unthought of. There is no reason why these railways should not be carriers of freight as well as passengers, and it is not at all visionary to surmise that as the steam railway superceded horse power for long hauls, so the electric railway may supplant it for short hauls.

The following diagram of concentric circles is submitted for the purpose of showing the relative distances which freight may be carried for the same cost by the different means of transportation now in use, that is to say, horses and wagons, electric street cars, steam cars, and steamships upon the Great Lakes.

The inner circle has a radius of five miles and the average cost of carrying a ton five miles with horses (which is the most expensive of any power in use) is $1.25, being 25 cents per ton per mile. The second circle and the next larger one has a radius of 25 miles and represents the distance which a ton can be carried without additional cost by substituting electric cars for horses and wagons. This is estimated at five cents per ton per mile. The third circle represents the distance covered by the steam cars, the radius of the circle being 250 miles. The average cost per ton per mile being only five mills.



The outer circle has a radius of 1,000 miles and represents the distance which can be reached by the steamships upon our lakes, without additional cost, that is to say the average rate of transportation per ton per mile is 1¼ mills, which makes for 1,000 miles, $1.25, the same as the cost for carrying a ton five miles with horses.

It will be observed that the proportion between the distances covered by the different kinds of transportation in use is as follows: Beginning with horse power, which is the most expensive and covers the shortest distance, and we have:

Horse power,	5	miles, cost of transportation per ton	$1.25
Electric “	25	“ “ “ “ “ “	$1.25
Steamship cars,	250	“ “ “ “ “ “	$1.25
Steamships on the Lakes	1,000	“ “ “ “ “ “	$1.25

In other words, by applying electricity, we can carry at the same cost five times as far as with horses.

By applying steam to cars, we can carry fifty times as far as with horses, and, by applying steamships to deep water, we carry two hundred and fifty times as far as we can with horses, and all at the same cost.

No matter how much may have been expended for these various means of transportation—whether of public money or private money—their value ceases as soon as a bettter means of transportation is brought into existence. That the steam cars and electric cars are both better means than horse power, so far as they can be applied, is apparent to any observer. There can be no doubt that the building of steam roads has been a mighty and controlling influence in massing the population as indicated above, and has cheapened transportation to such a low point as to carry a ton fifty times as far as can be carried by horse power at the same cost.

This may certainly be assumed: That we are only at the threshold of the door that leads to a more extended use of inanimate power to take the place of animal power as a means of transportation; that more electric roads will be built, that they will be almost innumerable, in fact unlimited, is evidenced by every indication, so that the problem of building the wagon road is made easier and easier by reason of the shortened distances for which horses may be profitably used for purposes of transportation. Five miles will probably measure the distance beyond which the horse cannot be used either for pleasure or for profit. It should also be observed that the ordinary earth road when in good condition, as it is during most of the year, is more suitable for light purposes and pleasure driving than macadamized roads or roads made hard with any kind of metal. By introducing the iron rails and inanimate power for rapid transit, and to take the heavier loads, the problem is solved.

This does not, of course, imply that the necessity for roads will entirely cease, but only that their use will be greatly restricted and the extent to which they need be built much curtailed.

In conclusion we would add that the plan of masterly inactivity may well be adopted by the Legislature of Ohio in regard to general road legislation. The enactments in other states are too recent to enable us to judge what will be the results flowing from them. The times are not propitious for entering upon experiments in this direction. There is no agreement among the advocates of new legislation upon the features that should be incorporated therein.

Schemes involving the expenditure of vast sums of public money and the increase of local indebtedness extending over long periods of time do not commend themselves to the members of this Commission. Until there shall arise a wide spread demand for legislation and the main features of such legislation are clearly marked and defined, it is useless to place enactments upon the statute rolls. . . . We do not feel that such a period has arrived in the history of the State of Ohio.

Respectfully submitted,

MARTIN DODGE, Pres.,
DAVID S. OLIVER, Secy.,
J. R. DUNLAP,
D. W. SPRAGUE,
Commissioners.

MINORITY REPORT.

HON. WILLIAM McKINLEY,
GOVERNOR OF OHIO.

The undersigned minority of the Road Commission wish to supplement the majority report as follows:

It being the established policy of the people to aid in cheapening transportation by deepening rivers, harbors and channels, by building roads and bridges, streets and viaducts—all by appropriations of public money and by contributing the use of streets and roads for electric cars—we see no reason why they might not as logically and more profitably contribute to the construction of electric railways, to be and remain a part of the common roads, as to the paving of these roads to be operated with horses and wagons, if in any locality the people should desire to do so.

We have already reached the maximum power of horses and other animals for draft, speed and endurance. The only improvement that we could hope to make to lessen the cost of transportation with these animals would be in improving the road-bed. A comparison of the cost will show that the average expenditure required to macadamize a road or make it hard and durable with any kind of metal is fully equal to the cost required to lay down steel rails over which not only wagons and carriages propelled by horses, but cars propelled by electric power might also go at a greatly reduced cost in transportation. Gilmore's Tables show that the same vehicle can be moved over steel rails with one-eighth of the power that would be required to move it over a macadamized road, and with one-eighteenth (1-18) of the power that would be required to move it over a gravel road, and with one twenty-fifth (1-25) of the power that would be required to move it over a common earth road in good condition. Having given the cost of construction, which is the same in each kind of road; and the cost of moving the vehicle being so much less over the steel rail than any other kind of road, and knowing also that the cost of inanimate power is less than the cost of animal power, it seems clear that the substitution of steel rails for macadamized roads, and inanimate power for animal power is destined to cheapen our transportation in the most effectual manner. The profitable use of steel rails and the application of inanimate power can only be limited by the convenience or inconvenience of terminal facilities, because it will always cost much less to move over a smooth iron rail than over a pavement—whatever power may be applied. This advantage may be neutralized by the disadvantage of loading and unloading—but that is the only thing which, in the long run, will limit the application of this new power.

The Hon. John M. Stahl, in a valuable article in the Illinois number of "Good Roads", has made a conservative estimate of the wagon freight of this country for the year 1892, as 500,000,000 tons. He also estimates that this will be transported over country highways an average distance of eight miles, which would be equivalent to 4,000,000,000 tons one mile. At a cost of 25 cents per ton a mile, which would be required to move it by horse power with ordinary vehicles, it would amount to the enormous sum of $1,000,000,000. This may be stated as the cost of operating wagon roads. Now, if by substituting steel rails and inanimate power, there could be a saving of four-fifths of this amount,—which would be much less than the proportion indicated by Gilmore's Tables,—the cost of moving this tonnage would be only $200,000,000 instead of $1,000,000,000, leaving a gain of $800,000,000. This for a period of ten years would leave a net gain of $8,000,000,000.

We have made great and unexpected improvements in the means of transportation where we have substituted other power for horse-power, while we have made but little improvement in the cost of transportation where we have adhered to animals as the motive power. To this fact should be added the other important one that millions and millions of dollars have been expended to aid in cheapening transportation with horses while nothing has been expended to aid the means that have been most successful in cheapening our rates of transportation; but if we should extend the same liberal policy to the electric car, that we have extended to horses and wagons by providing a free track for it to go upon as we have for other vehicles propelled by animals, the rate of transportation would be still farther cheapened in the future as it has been in the past, and a lower rate can be so reached than by any other means.

It seems probable that the application of electricity to the cars upon our streets and roads is destined to do for the short haul what the steam cars have already done for the long haul. So far as electricity has been applied already, it has shown that the cost of transportation by that means is far less than upon the steam cars, which is indicated by the rate of charge for transportation—the common rate upon steam cars being three cents per mile for passengers while in many cases upon the electric cars, it is but one cent or even less per mile. What has been done by way of cheapening transportation of passengers may be done to a great extent in cheapening the transportation of certain kinds of freight, especially the food products that are raised upon the farms and conveyed to the markets for immediate consumption. This may be done either with or without the aid of public money. Neither the steam cars nor the street cars, up to the present time, have received the aid of public money; but one element in the cheapening of transportation, which has assisted the electric street cars, is the use of the public streets and roads, which, though not money, is a contribution as valuable as money itself. The cheap rates which prevail upon the street cars could never be attained if the companies that operate these cars were obliged to appropriate and buy the lands upon which they build their roads; so that public *aid*, though not public *money*, has been given—and properly given—to cheapen transportation by that means.

The economical advantages are so greatly in favor of steel rails and electric power that no objection can be sustained against their introduction unless it rests upon the supposed inconveniences of using this new means in the most commodious manner. In all our great cities and most of our smaller ones, double tracks are already laid and are being rapidly extended to the suburbs for considerable distances, from ten to fifteen miles; their use at the present time is entirely confined to the matter of carrying passengers, but after midnight passenger traffic is over, and from that time until five o'clock in the morning these tracks are idle and the streets vacant. During that time they could be used to great advantage and with great economy for transporting freight and food products placed upon trail cars, to various markets and other places of distribution in the centers of population; so that the question of introducing steel rails and electric power is only a question of extension. The nucleus of the system already exists, and its use can undoubtedly be extended with great advantage.

"The Iron Horse was fleet, but in the chase
The Lightning Steed appears and wins the race."

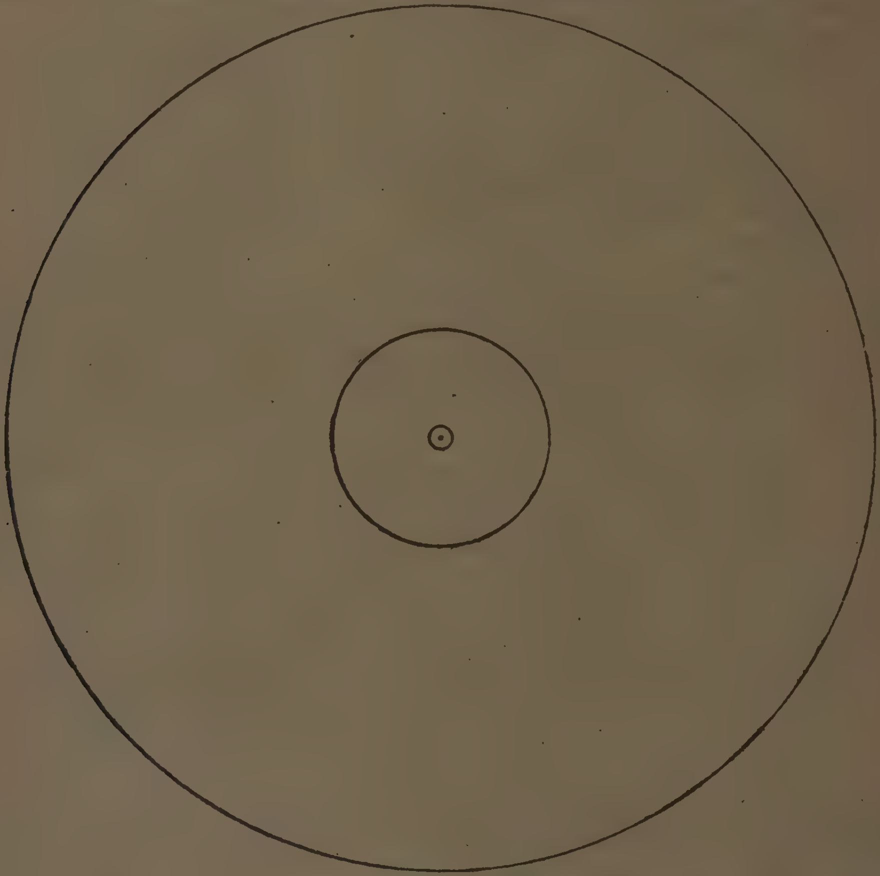
MARTIN DODGE.
D. W. SPRAGUE.

APPENDIX A.

COUNTIES.	KIND OF ROADS.	MATERIALS FOUND.	Cost per mile.	No. of miles Macadamized.	Amt. raised by taxation per year.	Cost of moving Freight per ton per mile.
ADAMS	Macadam	Limestone, Iron Rock.	$2560	220	$10428	25c
ALLEN	Mac. and Grav.	Limestone	1500	450	30000 to 60000	
ASHLAND	Dirt and Gravel.	Gravel		None.	12500	20c
ASHTABULA	Dirt and Gravel.	Gravel		None.	1000	12 to 50c
ATHENS	Dirt	Limestone, Grav., Sandstone	2500	15	20000	
AUGLAIZE	Gravel	Gravel	2500	350	25000	
BELMONT	Dirt	Limestone	4000 to 6500	130	20100	
BROWN	Macadam	Stone	2200	500	15000	25c
BUTLER						
CARROLL	Dirt	Sand, Limestone		Very few.	6000	
CHAMPAIGN	Gravel	Gravel	2500	Grav. Roads.	20000	
CLARKE	Gravel	Gravel, Limestone	2500	275	21000	15c
CLERMONT	Dirt	Stone, Gravel	2000	500	7000	50c
CLINTON	Gravel	Stone, Gravel	2500	500 Gravel	24343	15c
COLUMBIANA	Dirt	Limestone, Grav. Sand		One half.		50c
COSHOCTON	Dirt and Gravel.	Gravel, Stone		None (Grav.)	24950	20 to 30c
CRAWFORD	Dirt	Sandstone, Gravel	2500	20	8000	
CUYAHOGA	Dirt	Clay, Gravel		None.	90000	25c
DARKE	Gravel	Gravel	1200 to 1500	1000 Gravel.	15000	
DEFIANCE	Gravel	Gravel, Rock		10 or 12	20000	
DELAWARE	Stone and Grav.	Stone	2000	139	3057	
ERIE						
FAIRFIELD	Dirt	Gravel	1200 to 2000	None.	15000	
FAYETTE	Dirt and Gravel.	Drift Gravel	2800	400	15000	12½c
FRANKLIN	Mac. and Grav.	Gravel	2400	108 (298 Grav.)	14000	10 to 30c
FULTON	Dirt	Gravel	3000	3 or 4 of Grav		25c
GALLIA	Dirt	Lime and other stone		5 or 6	10000	
GEAUGA	Dirt	Dirt		None.	14000	25c
GREENE	Gravel	Stone, Gravel	2500 to 3000	11	3000	20c
GUERNSEY	Dirt	Little Gravel	3000 to 5000	6		
HAMILTON	Macadam	Limestone	5000	700		
HANCOCK	Dirt	Stone	2500		30000	
HARDIN	Gravel	Gravel	3000	300	15000	12½c
HARRISON	Dirt	Best Limestone	5000	25	19000	
HENRY	Dirt	Gravel	3200	35	13000	
HIGHLAND						
HOCKING						
HOLMES	Dirt and Gravel.	Limestone, Sandstone.		None.	15000	
HURON	Dirt	Sandstone	9000	3	None.	
JACKSON	Dirt	None		None.	18000	
JEFFERSON	Dirt	Limestone	5000	121½	66912	25c
KNOX	Dirt	Gravel		None.	2 000	
LAKE	Dirt			None.		
LAWRENCE	Mac. Dirt & Grav	Sandstone, Grav., Limestone	3000	754 (25 Grav.)	15000	10 to 20c
LICKING	Dirt	Gravel		29 (Nat. Pike)	23170	20c
LOGAN	Gravel	Stone, Gravel	1500 to 3500	440 with Grav	25000 to 30000	
LORAIN	Dirt	None		None.		
LUCAS	Dirt and Mac	Hard Hill Limestone		70 or 80	15000 to 20000	
MADISON	Gravel	Gravel	1500	400 Gravel.	20031	
MAHONING	Clay			None.		
MARION	Dirt and Gravel.	Grav., Blue Limestone	1500	230		
MEDINA	Dirt and Clay	Sandstone, Grav	7625	2	12000 to 15000	
MERCER	Dirt	Gravel, Limestone	2500	400 Gravel	70000	8 to 15c
MEIGS	Dirt	Sandstone		None.	10000	
MIAMI	Gravel and Dirt.	Gravel, Stone	1500	632 Gravel	30000	18c
MONROE	Dirt and Gravel.	Limestone		None.	5976	
MONTGOMERY	Gravel and Stone	Stone, Gravel	2000	½ of all roads		
MORGAN	Dirt	Limestone, Sandstone.	2500 to 4000	None.	25261	
MORROW	Dirt	Stone, Gravel		None.	12000	25c
MUSKINGUM	Dirt	Limestone, Gravel	10000	43	19500	25c
NOBLE	Dirt	Limestone, Sandstone.	5000	12	12000	15 to 40c
OTTAWA	Dirt	Stone		2		
PAULDING	Dirt	None		None.	3500	10c
PERRY						
PICKAWAY	Dirt and Gravel.	Gravel.	1600	None.	27750	10 to 20c
PIKE	Dirt	Stone, Gravel	1000	150	10000	
PORTAGE	Dirt	Stone, Gravel	1800	5	13500	
PREBLE	Gravel	Gravel, Stone		None.	25000 to 30000	15c
PUTNAM	Dirt	Stone, Gravel	2500 to 6000	75 to 100	60000	
RICHLAND	Dirt	None		1	22120	
ROSS						
STARK	Dirt	Limestone		None.	20000	
SANDUSKY						
SCIOTA	Gravel	Stone, Gravel	1200	200	20000	25c
SENECA	Dirt				20000	
SHELBY	Gravel	Gravel	3000	450 Gravel.	23000	10c
SUMMIT	Dirt	None	2000	2	16000	
TRUMBULL	Dirt	None		None.		20c
TUSCARAWAS	Dirt	Everything needed	7000	2	13000	
UNION	Gravel	Gravel, Stone	1500	8 to 10	10700	10c
VINTON	Dirt	Limestone Sandstone, Grav.		None.	7000	25c
VAN WERT	Dirt	Stone		20		
WARREN	Gravel	Limestone, Gravel	1500	43 (1800 Grav.)	25000	15 to 20c
WASHINGTON	Dirt	Limestone		5	18000	
WAYNE	Dirt	Gravel		None.	30000	20 to 30c
WILLIAMS	Dirt	Gravel		None.	18000	
WOOD	Dirt	Stone, Gravel	5000	16	7000	
WYANDOT	Dirt	Stone, Gravel		10		

The following diagram of concentric circles is submitted for the purpose of showing the relative distances which freight may be carried for the same cost by the different means of transportation now in use, that is to say, horses and wagons, electric street cars, steam cars, and steamships upon the Great Lakes.

The inner circle has a radius of five miles and the average cost of carrying a ton five miles with horses (which is the most expensive of any power in use) is $1.25, being 25 cents per ton per mile. The second circle and the next larger one has a radius of 25 miles and represents the distance which a ton can be carried without additional cost by substituting electric cars for horses and wagons. This is estimated at five cents per ton per mile. The third circle represents the distance covered by the steam cars, the radius of the circle being 250 miles. The average cost per ton per mile being only five mills.



The outer circle has a radius of 1,000 miles and represents the distance which can be reached by the steamships upon our lakes, without additional cost, that is to say the average rate of transportation per ton per mile is 1 1-4 mills, which makes for 1,000 miles, $1.25, the same as the cost for carrying a ton five miles with horses.

It will be observed that the proportion between the distances covered by the different kinds of transportation in use is as follows:—Beginning with horse power, which is the most expensive and covers the shortest distance, and we have:

Horse power, . . .	5	miles,	cost	of	transportation	per ton	$1.25
Electric "	25	"	"	"	"	" "	1.25
Steam cars	250	"	"	"	"	" "	1.25
Steamship on the Lakes	1000	"	"	"	"	" "	1.25

Date Due

JUN 8 1961

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JUN 29 1961

The Ohio State University
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REPORT OF THE OHIO ROAD COMMISSION

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